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## THE VALUE OF ANTIMENINGITIS SERUM IN THE TREATMENT OF EPIDEMIC CEREBRO-SPINAL MENINGITIS

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OF all the epidemic diseases met with in English-speaking countries, the most terrible in its manifestations and the most disastrous in its death-rate is cerebro-spinal meningitis. Outbreaks of this malady have been comparatively rare and comparatively short-lived. We have as yet no certain knowledge of the conditions under which it arises; but, if we are to judge by the history of its incidence in America during the past ten or twelve years, its occurrence in epidemic form is becoming more frequent, and the tendency to linger where it has once gained a footing is becoming more marked.

Within the past two years extensive outbreaks have occurred in some parts of Scotland and Ireland. The larger cities have suffered most, Glasgow and Edinburgh and Leith in Scotland, and Belfast in Ireland. Commencing with great suddenness in these cities, cases rapidly appeared in widely separated districts having no apparent connection with each other. It is true, and fortunately so, that the total number of the inhabitants attacked in these places has been but a small proportion

of the population, but the disease is so terrible in its consequences that it causes more widespread alarm than any other form of epidemic outbreak. Although the microbic cause of the disease is now definitely ascertained, but little is known of its method of spreading, and no theory of its propagation as yet suggested can be accepted as satisfactory; hence the public health authorities can do very little to cope with it, and this adds much to the dread caused by its appearance in a community. This alarm is only natural, when it is remembered with what terrible rapidity many of the cases proved fatal, and the fearful havoc wrought amongst those who did survive. Many of those attacked died within a few hours of the onset, and that after terrible suffering, while many of those who survived the acute attack lingered on for weeks and months, going steadily downhill in spite of every effort to save them. Again, many of those who did survive were left permanently maimed.

Until recently it must be confessed that no known treatment could be said to produce any marked effect on the course of the disease; for, while it could with justice be claimed that treatment and careful nursing did turn the tide in the patients' favour in some instances, the proportion of cases so influenced was so small as to be almost inappreciable.

#### THE ADVENT OF ANTIMENINGITIS SERUM FOR INTRASPINAL INJECTION

After prolonged and patient experiments on the lower animals in the laboratory, Dr. Simon Flexner and Dr. J. W. Jobling, of the Rockefeller Institute for Medical Research, New York, produced an antimeningitis

serum, obtained from the horse, for use by intraspinal injection in this disease. This serum was first tried in the spring of 1907 ; and the complete revolution, brought about by the adoption of this method of treatment, will be readily appreciated by contrasting the results obtained in cases before its use with those obtained since its introduction. Fortunately, accurate statistics are available from all the more recent epidemic outbreaks.

### RESULTS BEFORE THE USE OF THE SERUM

Of 4,000 cases in New York in 1904, 75 per cent. died.

Baker reports from Greater New York, 2,113 cases with 1,636 deaths, giving 77·4 per cent. mortality.

Chalmers reports from Glasgow (1907) 998 cases with 683 deaths, giving 68·4 per cent. mortality.

Bailie reports in Belfast (1907) 623 cases with 493 deaths, giving 79·2 per cent. mortality.

Ker reports that in the Edinburgh epidemic there was 78 per cent. mortality.

Robertson reports from Leith (1907) 62 cases with 74·4 per cent. mortality.

Turnour reports from the Transvaal 200 cases with 74 per cent. mortality.

Amongst patients treated *in hospitals* the death-rate was not better, for of

202 cases in Ruchill Hospital, Glasgow	79·2% died
108     ,,     Edinburgh Fever Hospital	80·5%   ,,
275     ,,     Belfast Fever Hospital	72·3%   ,,

and Dunn reports that in the Boston Children's Hospital, during the eight years 1899-1907, the mortality varied from 69 per cent. to 80 per cent.

RESULTS IN CASES TREATED WITH FLEXNER AND  
JOBBLING'S SERUM.

	Cases.	Died.	Mortality. Per cent.
City Hospital, Cincinnati ... ..	45	14	31·1
Dr. Dunn, Boston ... ..	40	9	22·5
Johns Hopkins Hospital, Boston	22	4	18·1
Rhode Island Hospital ....	17	6	35·2
Lakeside Hospital, Cleveland ...	29	11	37·7
Edinburgh Fever Hospital ...	33	13	42·3
Mount Sinai Hospital (Children)	15	2	13·3
Municipal Hospital, Philadelphia	21	9	42·7
Belfast Fever Hospitals ... ..	98	29	29·6

Flexner and Jobling have collected statistics of 411 cases treated with the serum, of which 151 died: a mortality of 36·7 per cent. This series embraced all the available figures up to that time, and included many cases in which the serum was given too late to allow of hopeful results, and also many cases at the early stage of its employment which are now known to have received inadequate doses. It is confidently hoped that with increased experience of the amount and frequency of the injection necessary, even better results will be obtained.

From these figures it will be seen that the death-rate in the cases not treated with the serum averaged some 75 per cent. This has been reduced in cases treated with the serum *to less than half*, and in many instances much below that figure.

My own experience has been that of 275 cases under my care in hospital before the use of the serum was commenced 72·3 per cent. died; while of the 98 cases treated with the serum 29·6 per cent. died. No selection of cases was made: *every* case sent into hospital since September, 1907, has been treated in



this way. No change in the severity of the attacks was observed: in the three months *immediately before* the serum arrived with us, 45 cases came under treatment, of whom 37, or 82 per cent., died; and in the first four months after we began its use in hospital 30 cases were treated, of whom 8 died, a mortality of 26·6 per cent.; while of the 34 cases occurring in the City *in the same period* but not sent into hospital, and not treated with the serum, over 80 per cent. died.

Great as this change in the death-rate has been, it is not more striking than the improvement in the course run by the cases; for whereas it was common to have cases running on into weeks and even months, such cases are no longer met with; the duration of illness in those who do recover has been greatly reduced, and with this reduction there has also been a marked diminution in the number of serious complications and sequelæ occurring.

More recently similar antisera have been produced in other places, notably in Germany, and encouraging reports are being collected from districts in which they have been employed.

It is true that sufficient serum for the treatment of hundreds of cases can *now* be produced from a single horse with what amounts to little more than inconvenience to the animal, but it is also true that this serum could only, in the first instance, have been obtained, and sufficiently tested to warrant its use in human subjects, by repeated experiments on animals in the laboratory.

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